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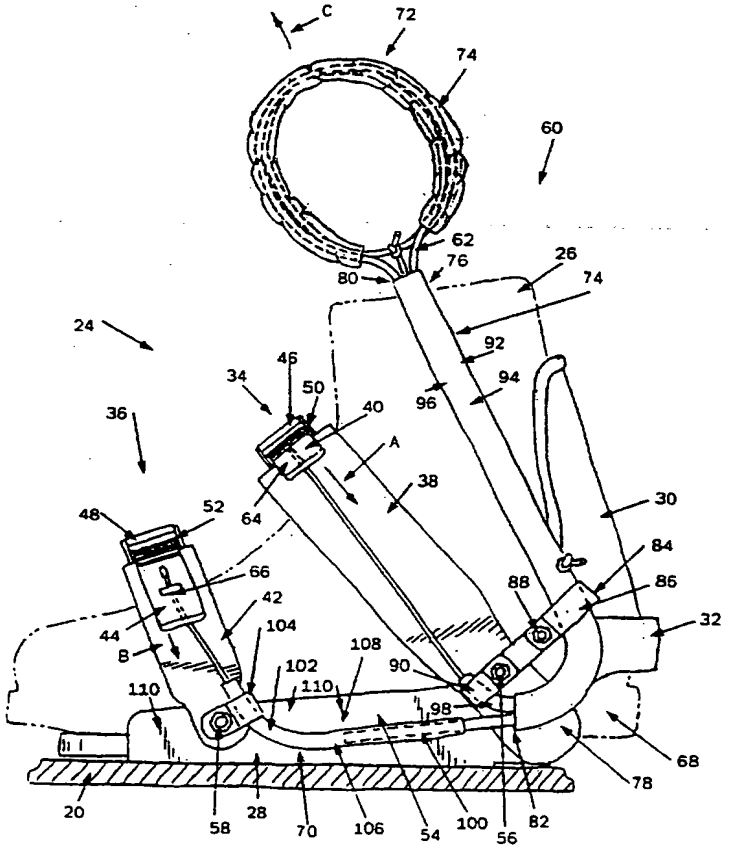
(54) Title: SNOWBOARD BINDING

(57) Abstract

A snowboard binding which has a base number (70), a toe strap assembly (36), and an ankle strap assembly (34). There is a tightening device comprising a cable (62), one end of which is connected to a ratcheting member (44) of the toe strap assembly, the other end of which is connected to a ratcheting member (40) of the ankle strap assembly. An intermediate portion of the cable (72) is attached to a handle (74) through which the cable can slide. By pulling on the handle (C), two ends of the cable pull against the toe strap assembly and the ankle strap assembly to tighten both the toe strap and the ankle strap assembly.



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SNOWBOARD BINDING

RELATED APPLICATION

This application claims priority of U.S. Provisional Patent Application Serial No. 60/012,590, which was filed on March 1, 1996. and is a continuation-in-part of an application filed in the United States on 28 February 1997, identified by Attorneys' Matter No. P4124.

TECHNICAL FIELD

The present invention relates to snowboard bindings and, in particular, to conventional strap-on snowboard bindings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing a snowboard on which is mounted a binding constructed in accordance with, and embodying, the principles of the present invention;

FIG. 2 is a side plan view taken along lines 2-2 in FIG. 1 depicting the binding of the present invention in its loosened state;

FIG. 3 is the same view as FIG. 2 depicting the binding of the present invention in its tightened state;

FIG. 4 depicts a prior art buckle and strap connection;

FIGS. 5A and 5B depicts a modification to the prior art buckle and strap that allows the present invention to be implemented in the form of a retrofit kit for existing prior art bindings;

FIG. 6 depicts a second embodiment of a binding constructed in accordance with the present invention;

FIG. 7 depicts yet another embodiment of the present invention also taken along liens 2-2 in FIG. 1, the binding depicted in FIG. 7 being shown in its loosened state;

FIG. 8 depicts a portion of the third embodiment shown in FIG. 7 to illustrate a remote locking feature of this third embodiment;

FIG. 9 is a perspective view of another exemplary snowboard binding assembly constructed in accordance with, and embodying, the principles of the present invention;

FIG. 10 is an exploded view of a snowboard binding of the same basic design as shown in FIG. 9;

FIGS. 11A and 11B are cut-away plan views of a housing and cable assembly employed by the snowboard binding shown in FIGS. 9 and 10;

FIG. 12 is a plan view of a housing cover employed by the housing assembly as shown in FIG. 10;

FIG. 13 is a top plan view of a skid plate as shown and described in relation to FIG. 10;

FIG. 14 is a top plan view of a universal bracket employed by the ski boot binding shown in FIG. 10; and

FIGS. 15A and 15B depict a portion of a handle assembly that may be used in connection with the snowboard binding shown in FIGS. 9 and 10.

DETAILED DESCRIPTION

Depicted therein at 20 is a snowboard having a front binding 22 and a rear binding 24 mounted thereon. Except as will be noted below, the construction and use of bindings such as the bindings 22 and 24 is well known in the art, and these bindings will not be described in any more detail than is necessary for a complete understanding of the present invention.

Referring now to FIG. 2, depicted therein is the rear binding 24. Shown by broken lines in FIG. 2 is a boot 26 that is received by the binding 24. The boot 26 is conventional and will not be described in detail herein.

The binding 24 is conventional in that it has a base assembly 28 securely attached to the snowboard 20 and a heel member 30 rotatably attached to a heel support 32 integrally formed with and extending from the base assembly 28.

The binding 234 further comprises strap assemblies 34 and 36 which extend over a front portion of the boot 26. When cinched tight as shown in FIG. 3, the strap assemblies 34 and 36 hold the

boot 26 onto the base assembly 28, and thus the board 20, and against the heel member 30.

The strap assemblies 34 and 36 are similar in structure but not identical. The strap assembly 34 comprises an inner strap 38 and an outer strap 40. The strap assembly 36 also comprises an inner strap 42 and an outer strap 44. The primary difference between the strap assemblies 34 and 36 is that the straps 38 and 40 are longer than the straps 42 and 44 to accommodate a larger portion of the boot 26.

The inner straps 38 contact the boot 26 and are cushioned to prevent damage to the boot 26 and to absorb shocks when the board 20 is in use. Additionally, mounted on the inner straps 38 and 42 are spring-loaded clips 46 and 48. These clips 46 and 48 are adapted to engage sets 50 and 52 of teeth formed on the outer straps 40 and 44. The clips 46 and 48 engage the sets 50 and 52 of teeth in a known manner to selectively lock the positions of the outer straps 40 and 44 relative to the inner straps 38 and 42.

While the basic structure of the strap assemblies 34 and 36 is known, these straps are unusual in that the outer straps 40 and 44 are much longer than in a conventional snowboard binding. The purpose of this will become clear from the explanation below.

The inner straps 38 and 42 are fixed to a side brace portion 54 of the base assembly 28. In particular, a nut/bolt assembly 56 mounts the inner strap 38 on to the side portion 54, while a second

bolt/nut assembly 58 securely mounts the inner strap 42 on to the side portion 54. Similar bolt/nut assemblies (not shown) attach the outer strap 44 to the other side of the base assembly 28.

Accordingly, with the outer straps 40 and 44 received within the clips 46 and 48 formed on the inner straps 38 and 42, the strap assemblies 34 and 36, in combination with the base assembly 28, surrounds the boot 26. By displacing the outer straps 40 and 44 in the direction shown by arrows A and B from the positions shown in FIG. 2 to the positions shown in FIG. 3, the strap assemblies 34 and 36 are cinched tightly against the boot 26. The clips 46 and 48 engage the sets 50 and 52 of teeth to hold the straps 34 and 36 in the tightened position shown in FIG. 3. To move the strap assemblies 34 and 36 back into the position shown in FIG. 2, the clips 46 and 48 are opened to disengage these clips 46 and 48 from the sets of teeth 50 and 52.

Except for the length of the outer straps 40 and 44, the construction and operation of the snowboard 20, base assembly 28, heel member 30, and strap assemblies 34 and 36 as described above is conventional and well known in the art.

But the binding 24 additionally comprises a cable assembly 60 adapted to be mounted on the base assembly 28. The cable assembly 60 comprises a cable 62 configured such that pulling on a portion of this cable displaces the outer strap members 40 and 44 in the direction shown by arrows A and B.

In particular, end portions 64 and 66 of the cable 62 are attached to the outer straps 40 and 44 and the cable 62 is braced at locations 68 and 70 such that pulling a loop portion 72 of the cable 62 upward in the direction shown by arrow C causes the cable ends 64 and 66, and thus the outer straps 40 and 44, to move downward in the direction shown by arrows A and B.

The cable 62 thus allows the user of the snowboard 20 to move the strap assemblies 34 and 36 into the tightened position shown in FIG. 3 without having to reach down and pull the outer straps 40 and 44 towards the snowboard 20.

The cable assembly 60 will, in general, make it easier for the snowboarder to fasten the boot 26 into the binding 24. Conventionally, this process requires bending or sitting down because pulling the outer straps downward to cinch the boot in the binding is very difficult when the snowboarder is standing and wearing the boot.

The cable assembly 60 has even more significance in the context of getting on and off ski lifts. While standing in line waiting to get on the ski lift, it is conventional for the snowboarder to keep the front foot in the front binding and remove the rear foot from the rear binding. This allows the snowboarder to push the board with the rear foot while moving slowly, perhaps uphill, to the point where the snowboarder gets on the lift chair.

Once the snowboarder is on the chair, however, the snowboard is dangling from the front foot. This

alone is often uncomfortable for the snowboarder as the entire weight of the board is borne by one foot. When the snowboarder needs to get off the chair at the upper end of the lift, the snowboarder must navigate the slight downward slope normally found at the upper end of the lift with only one foot in the snowboard binding. Control of the snowboard with one foot is very difficult, and it is not uncommon for the snowboarder to fall while trying to get off the lift.

To overcome the problems associated with getting off the lift with only one foot strapped onto the board, some snowboarders will attempt to insert the rear foot into their rear binding while on the chair. This process is quite awkward given that the snowboarder is in a sitting position when in the lift chair.

With the binding 24 as described above, however, the cable assembly 60 greatly facilitates the act of getting the snowboarder's rear foot into the binding, even while sitting on a ski lift chair.

In particular, when the snowboarder finishes a run and gets in the lift line, the snowboarder removes the boot 26 from the rear binding 24. With the binding 24, this is done in a conventional manner by releasing the clips 46 and 48 and moving the outer straps 40 and 44 in directions opposite the arrows A and B to lengthen the strap assemblies 34 and 36. The extra length of the outer straps 40 and 44 allows the loops defined by the strap assemblies 34 and 36 to be much larger than a traditional set of strap assemblies.

To place the boot back into the binding 24, the snowboarder need not sit in order to cinch the strap assemblies 34 and 36 tight against the boot 26. To the contrary, while standing, the snowboarder may guide the boot 26 into the binding 24 underneath the relatively large loops formed by the lengthened straps 34 and 36. Then, while still standing, the snowboarder can grasp the loop 72 and pull it in the direction shown by arrow C to cinch the strap assemblies 34 and 36 tight against the boot 26. Using the cable assembly 60, it is not necessary to sit down and pull downwardly on the ends of the outer straps 40 and 44.

When riding a ski lift, the snowboarder maneuvers into position to get onboard the lift chair with the front foot bound in the board and the rear foot loose, as in the conventional manner. But once the snowboarder is off the ground and being carried by the lift, the snowboarder can direct the boot 26 into the binding 24 underneath the large loops formed by the strap assemblies 34 and 36. The snowboarder can then pull on the loop 72 to cinch the strap assemblies 34 and 36 tight against the boot 26. This is very easy using the cable assembly 60 because the loop 72 is located just below the snowboarder's knee, within easy reach when the snowboarder is in a sitting position.

With the foregoing understanding of the operation of the present invention, the cable assembly 60 employed by the binding 24 will now be described in further detail.

Referring initially to the cable 62, the exemplary cable 62 is a single piece of twisted metal wire. The exact material from which the cable 62 is formed is not critical, as long as it has sufficient strength to withstand the loads necessary to displace the outer straps 40 and 44 under typical snowboarding conditions and does not rust.

The loop 72 is formed at approximately the middle portion of the cable 62. In particular, the loop portion 72 is formed by making two complete loops in the cable center portion. A flexible sheath 74 is placed around the loop to prevent the wire from springing back into its unlooped configuration.

The free ends of the cable 62 are fed through a snorkel member 74. An upper end 76 of the snorkel member 74 is arranged adjacent to an upper portion of the boot 26, while a lower end 78 thereof is arranged adjacent to the heel of the boot 26.

The snorkel member 74 is hollow and made of semi-rigid plastic. An upper opening 80 of the snorkel member 74 is defined by the upper end 76, while a lower end opening 82 is defined by the lower end 78. The lower end 78 of the snorkel member 74 is curved in a generally snorkel-like fashion such that the lower opening 82 faces across the snowboard 20 and the upper opening 80 faces up along the snowboarder's leg.

When the cable 62 extends through the snorkel member 74, the loop portion 72 is adjacent to the

upper end 80 and the cable end 64 and 66 extend out the lower ends and 82 thereof.

The snorkel member 74 and cable 62 contained therein are held in the position just described by a bracket 84. The bracket 84 is secured to the base assembly 28 by the bolt/nut assembly 56 used to attach the inner strap member 38 onto the base assembly 28. The bracket 84 comprises a first loop portion 86 through which the snorkel member 74 passes. The loop portion 86 is closed by a bolt/nut assembly 88 such that the snorkel member 74 is rigidly held in the above-described orientation relative to the base assembly 28. The bracket 84 comprises a second loop portion 90 arranged on the opposite end of the bracket 84 from the first loop portion 86. The purpose of this second loop portion 90 will be described shortly.

The cable member 62, as mentioned above, is preferably made of metal wire, while the snorkel member 74 is a semi-rigid plastic. Metal tubes 92, 94, and 96 are placed within the snorkel member 74. The end 64 of the cable member 62 is passed through the third tube 96 while the second end 66 of the cable 62 is passed through the first tube 92. Significant portions of the tubes 92 and 96 are shaped like the snorkel member 74, but lower ends 98 and 100 of these tubes extend out of the snorkel member 74. The lower end 98 of the third tube 96 is held by the second loop portion 90 of the bracket 84. The lower end 100 of the first tube 92 extends to approximately the middle of the snowboard 20.

The second end 66 of the cable 62 is passed also through a fourth tube 102. This fourth tube 102 is held in place near the instep of the boot 26 by a toe bracket 104. This fourth tube 102 provides support for the cable 62 at the second support location 70.

These tubes 92 and 96 guide the cable 62 around the support location 68 and prevent excessive wear on the snorkel member 74.

A cylindrical jacket 106 made of flexible plastic material is arranged to cover the lower end 100 of the first tube 92 and the fourth tube 102. A gap 108 exists between the lower end 100 of the first tube 92 and the fourth tube 102.

The jacket 106 provides protection for tubes 92 and 102. The arrangement of this jacket 106 and the gap 108 also allows for a variability between the locations at which the nut/bolt assemblies 56 and 58 are connected to the base assembly 28. In particular, a plurality of holes 110 are conventionally formed in the side flange 54. The forwardmost bolt/nut assembly 58 can be put in any of these holes 110 depending on the size of the boot to be held by the binding 24. To accommodate larger boots, the jacket 106 is slid further, but not completely, off of the lower end 100 of the tube 92.

The ends 64 and 66 of the cable 62 are attached to the outer straps 40 and 44 as follows. As perhaps best shown in FIG. 3, the end 64 of the cable 62 is molded into the outer strap 46. However, the cable 62 exits the outer strap 40 at a

location 112. This location 112 is spaced from a distal end 114 of the outer strap 40. The purpose of this spacing is to allow the distal end 114 of the strap 40 to overlap the bracket 84, if necessary, when the strap assembly 64 is fully cinched down.

The other end 66 of the cable 62 passes through a hole 116 in the outer strap 44. This hole 116 is similarly spaced from a distal end 118 of the strap 44. A lock member 120 is attached to the cable 62 to prevent the cable 62 from being drawn back through the hole 116. Additionally, this lock member 120 can be moved along the cable to allow the cable length to be adjusted as necessary.

As described above, three tubes 92, 94, and 96 are contained within the snorkel member 74. The second tube 94 extends only partly down the snorkel member 74. A resilient cord 122 passes through the second tube 94. An upper end 124 of the cord 122 is tied to the cable 62. A lower end 126 of the cord 122 is fixed to a lower portion of the snorkel member 74. The resilient cord 122 applies a return of force on the cable 62.

From the foregoing description of the basic operation of the cable assembly 60, it should be clear that when the loop portion 72 is pulled in the direction shown by arrow C, a certain amount of cable is drawn back into the snorkel member. The loop member 72 as shown and described simply increases in diameter to take up the extra cable. This can be seen by a comparison of FIGS. 2 and 3. The resilient cord 122 facilitates this action by

making sure that the loop portion 72 is always adjacent to the upper end 76 of the snorkel member 74. More specifically, in between FIGS. 2 and 3, the cable will be in a third state in which the loop is displaced away from the upper end 76 of the snorkel member 74. But when the loop portion 72 is released, the resilient member 122 will draw it back towards the snorkel member 74, causing any cable drawn back into the snorkel member to be taken up by the increasing diameter of the loop portion 72.

The cable assembly 60 described above may be built into the binding 24 during manufacture or be retrofitted onto a conventional binding at a later point. To facilitate the embodiment to the present invention in a retrofit kit form, the outer cables 40 and 44 may be modified as shown in FIGS. 5A and 5B.

Referring initially for a moment to FIG. 4, depicted therein is a prior art outer cable 128. More specifically, FIG. 4 depicts what is referred to herein as a proximal end (i.e., opposite the distal ends such as the ends 114 and 118 shown in FIG. 3) of the outer cable 128. This proximal end 130 is connected to an over-the-center latch 132 that is securely attached to a binding base assembly. The over-the-center latch 132 defines a channel 134. In conventional outer straps such as the strap 128, the distal end thereof is simply passed through this channel until an enlarged stop portion 136 of the strap 128 engages projections 138 and 140 defining a portion of the channel 134.

The prior art arrangement assumes that the distal end of the strap 128 is free so that it may be simply pushed through the channel 134.

But with the cable assembly 60 of the present invention, the distal ends 114 and 118 of the outer straps 40 and 44 are not free; to the contrary, the cable 62 attached thereto might obstruct the ability of the distal ends 114 and 118 to pass through the channel 134.

Accordingly, as shown in FIGS. 5A and 5B, a proximal end 142 of the outer straps 40 and 44 is manufactured without a stop portion such as the stop portion 136 of the strap 128. Instead, a series of holes 144 are formed on this proximal end 142. The use of a plurality of holes 144 allows the proximal end 142 to be cut to adjust the length of the straps 40 and 44 as appropriate for a given binding configuration. Each of the straps 40 and 44 is also provided with a stop member 146, plate 148, and screw 150. With the standard over-the-center latch 132, the proximal end 142 of the straps 40 and 44 is passed through the channel 134 as shown by arrow D in FIG. 5B. The stop bracket 146 is then bolted through one of the holes 144 onto the strap 40 or 44 by the screw 150 and plate 148. To this end, the stop bracket 146 has abutment surfaces 152 and 154 formed thereon which engage the projections 138 and 140 on the over-the-center latch 132 to prevent the strap members 40 and 44 to be withdrawn from the channel 134 in a direction opposite that shown by arrow D.

In certain commercially available over-the-center latches, the position of the projections 138 and 140 is switched such that they are on the inside of the channel 134 rather than on the outside as shown in FIG. 5A. In this case, the stop bracket 146 is simply placed on the inside of the straps 40 and 44 rather than on the outside. In either configuration, however, the stop bracket 146 has a main body portion 156 sized and dimensioned to fit between the projections 138 and 140 as perhaps best shown in FIG. 5B.

Referring now to FIG. 6, depicted therein is a second embodiment of a binding 220 constructed in accordance with, embodying the principles of the present invention. This binding 220 operates in the same basic manner as the binding 24 described above, and will be described below only to the extent that it differs from the binding 24. For components of the binding 220 that are the same as those of the binding 24, the same reference character will be used in the discussion of the binding 220.

The primary difference between the bindings 24 and 220 is that the cable assembly comprises first and second cables 222 and 224. A lower end 226 of the first cable 222 is connected to the outer strap 40, while the lower end 228 of the second cable 224 is connected to the outer strap 44. Upper ends 230 and 232 of the cables 222 and 224 connected to first and second handles 234 and 236.

Rather than pulling on a portion of a single cable, with the binding 220 each of the handles 234 and 236 must be pulled to put the strap

assemblies 34 and 36 into their tightened positions. The binding 220 does not have the advantage of a loop for automatically taking up any excess cable, but could be applicable to a binding having three straps. A three-strap binding would be difficult to accommodate with a single cable having only two ends.

Referring now to FIG. 7, depicted therein at 320 is a third embodiment of a binding constructed in accordance with, and embodying, the principles of the present invention. This binding 320 is also similar to the binding 24 described above. The binding 320 will thus also be described to the extent that it differs from the binding 24, with like reference characters being used to denote elements of the binding 320 that correspond to those of the binding 24.

As with the binding 24 described above, the cable 62 is arranged to tighten the strap assemblies 34 and 36. In the binding 320, the strap assembly 34 comprises an inner strap 322 and an outer strap 324. The strap assembly 36 comprises an inner strap 326 and an outer strap 328. The inner straps 322 and 326 differ from the straps 38 and 42 described above in that they do not comprise a locking clip such as the clips 46 and 48 described above. Instead, guides 330 and 332 are attached thereto. The outer strap 324 and 328 differ from the straps 40 and 44 in that they do not have sets of teeth thereon. Instead, the straps 324 and 328 simply pass through the guides 330 and 332, with the

guides 330 and 332 ensuring that the various straps are appropriately aligned.

Of course, elimination of the sets of teeth and locking clips means that there is no way that the strap assemblies 34 and 36 can lock themselves into their tightened positions. Instead, the appropriate locking action is provided by a cylinder assembly 334.

The cylinder assembly 334 comprises an inner cylinder 336 and outer cylinder 338. Both of these cylinders 336 and 338 are hollow, with the outer diameter of the inner cylinder 336 being slightly smaller than the inner diameter of the outer cylinder 338.

The inner cylinder 336 is arranged such that it telescopes into and out of the outer cylinder 338. Mounted at a lower end 340 of the inner cylinder 336 is a lower pulley member 342. Similarly, a pulley member 344 is mounted at an upper end 346 of the outer cylinder 338. The lower pulley member 342 is securely attached to the base assembly 26.

The cable 62 is arranged around these pulleys 342 and 344 such that displacement of the pulley 344 upward in a direction shown by arrow E in FIG. 7 away from the pulley 342 causes the cable 62 to be retracted inside the cylinder member 336 and 338. Accordingly, by pulling a handle 348 mounted on the upper end 346 of the outer cylinder 338, the cable ends 64 and 66 may be drawn downwardly to put the strap assemblies 34 and 36 into the tightened configuration. The arrangement of pulleys stores cable drawn into the cylinder

assembly 334 in a ratio determined by the number of pulleys used.

To hold the strap assemblies 34 and 36 in this tightened configuration, a locking system 350 is provided on the cylinder assembly 334. In particular, a vertical slot 352 and series of horizontal slots 354 are formed in the outer cylinder 338. A pin 356 is securely attached to the inner cylinder 336. By rotating the outer cylinder 388 as shown by arrow F, pulling up on the handle 348 until the straps 34 and 36 are in the tightened configuration, and then rotating the outer cylinder in a direction opposite the arrow F such that the pin 356 enters one of the slots 354 as shown in FIG. 8, the position of the outer cylinder 338 relative to the inner cylinder 336 may be fixed. This results in a locking action that holds the strap assembly 334 and 336 in their tightened configuration.

To help prevent the pin from being jostled out of the slots 54, notches 358 may be formed in the outer cylinder 338 above each of the slots 354 to receive the pin 356.

The locking system 350 might be used by itself, or in some situations in conjunction with over-the-center buckles that can be used to further tighten the strap assemblies 34 and 36.

Additionally, the cylinder assembly 334 may be provided with an internal cam lock as the locking system 350. Such cam locks are known in the art, and, by rotating the outer cylinder 338 relative to the inner cylinder 336 approximately one-quarter of

a turn, an internal cam will fix the position of these cylinders 338 and 336 relative to each other to obtain the same effect as the pin and slot locking system 50.

Referring now to FIG. 9, depicted therein at 420 is yet another exemplary binding assembly constructed in accordance with, and embodying, the principles of the present invention. The binding assembly 420 may be substituted for the binding 24 of the snowboard 20 described above.

The binding assembly 420 comprises a foot receiving portion 422 and a cable assembly 424. The foot receiving portion 422 is sized, dimensioned, and configured to attach a snowboarder's boot to a snowboard. The basic construction and operation of this foot receiving portion 422 is known in the art. The foot receiving portion 422 will thus be described below only to that extent necessary to provide a complete understanding of the operation of the cable assembly 424 of the present invention.

The foot receiving portion 422 comprises a base member 426, a heel member 428, and forward and rear straps 430 and 432. The base member 426 and heel member 428 can be of conventional design. The straps 430 and 432 extend over the base member 426 and can be loosened to allow the snowboarder to place his foot into and remove his foot from a boot region 434 and tightened to bind a boot within this region 434 to the snowboard.

The cable assembly 424 is mounted to the foot receiving portion 422 and connected to the straps

430 and 432 to facilitate the lengthening and shortening of the straps 430 and 432.

In particular, the cable assembly 424 comprises a housing assembly 436 and a cable 438. The housing assembly 436 is fixed relative to the base member 426. As is well known in the art, the base member 426 is rigidly connected to the snowboard 20, so the housing assembly 436 is also fixed relative to the snowboard to which the binding assembly 420 is attached. The cable 438 has a first end 440 connected to the forward strap assembly 430 and a second end 442 connected to the rear strap assembly 432.

The cable 438 is passed through the housing assembly 436 such that a center portion 444 of the cable 438 extends from a first opening 446 in the housing assembly 436. The cable ends 440 and 442 extend out of openings 448 and 450, respectively, in the housing assembly 436.

Pulling the center portion 444 out of the opening 446 causes the cable ends 440 and 442 to be drawn towards their respective openings 448 and 450. And as mentioned above, these cable ends 440 and 442 are connected to the cable assemblies 430 and 432; retraction of these cable ends 440 and 442 towards the openings 448 and 450 causes effective lengths of the cable assemblies 430 and 432 to shorten. The cable 438 so connected thus facilitates the process of shortening the effective lengths of the strap assemblies 430 and 432.

The housing assembly 436 is attached to the base member 426 and configured such that an upward

movement of the middle portion 444 causes downward movement of the cable ends 440 and 442. This facilitates the process of tightening the cable assemblies 430 and 432 in at least two ways. First, the user does not have to reach down to his or her foot and then exert a downward force on the strap assemblies 430 and 432. Second, upward force vectors applied to the cable middle portion 444 will result in an upward force being applied to the base member 426, thereby causing the base member 426 to be brought up against the sole of the boot within the boot chamber 434.

Referring now to FIG. 10, depicted therein is an exploded view of the binding assembly 420. In FIG. 10, the locations of the strap assemblies 430 and 432 and cable assembly 424 are reversed as compared to that shown in FIG. 9, illustrating that the present invention can be used on either side of the foot receiving portion 422 of the binding assembly 420.

As is shown in FIG. 10, the toe or forward strap assembly 430 comprises a first strap 452 and a second strap 454. The heel or rear strap assembly 432 comprises a first strap 456 and a second strap 458. A first end 460 of the strap 452 is attached to a flange 326a of the base member 326 by an attachment assembly 462 comprising a bolt 464, star washer 466, first spacer 468, second star washer 470, second spacer 472, washer 474, and nut 476. A first end 478 of the second strap 454 is attached to an opposite side flange 426b of the base member 426 by an attachment assembly 480. The

attachment assembly 480 comprises a bolt 482, star washer 484, washer 486, and bolt 488.

A first end 490 of the first strap 456 is attached to the side flange 426a by an attachment assembly 492 comprising a bolt 494 and a nut 496.

A second end 498 of the second strap 458 is attached to the flange 426b by an attachment assembly 500 comprising a bolt 502, washer 504, and a bolt 506. Second ends 508 and 510 of the straps 452 and 454 are connected together by a buckle assembly 512. A similar buckle assembly 514 connects together ends 516 and 518 of the straps 456 and 458.

The buckle assemblies 512 and 514 are, in the exemplary binding assembly 420 identical, and the same reference characters will be used to identify like components of these buckle assemblies 512 and 514.

The buckle assembly 512 comprises a mounting plate 520 that is attached to the end 510 of the strap 454 by a rivet 522. Rotatably connected to the base 520 are a latch member 522 and a release block 524. The latch member 522 of the buckle assembly 512 is shown in its open position, while the latch member 522 of the buckle assembly 514 is shown in its closed position. When the latch member 522 is in its closed position, it engages teeth 526 formed on the end 508 of the strap 452 to prevent relative movement between the ends 508 and 510 of the straps 452 and 454. When the latch member 522 is in its open position, relative movement between these strap ends 508 and 510 is

allowed, thereby allowing the effective length of the entire strap assembly 430 to be increased or decreased.

The release blocks 524 are connected by a release cable 528 such that lifting up on the cable 528 causes these blocks to rotate or pivot upwardly and move the latch members 522 into their open position. Thus, simply by grasping and pulling on the release cable 528, both of the buckle assemblies 512 and 514 can be released to allow the effective length of the cable assemblies 430 and 432 to be increased.

FIG. 10 also depicts cable connecting assemblies 530 and 532 employed to connect the ends 440 and 442 of the cable 438 to the ends 508 and 516 of the straps 452 and 456. These cable connecting assemblies 530 and 532 are identical in the exemplary binding assembly 420, so the same reference characters will be used to identify like components of these assemblies 530 and 532.

The cable connecting assembly 530 comprises an attachment plate 534 and a latch block 536. A rivet 538 is used to attach the connecting plate 534 to the cable end 442. The end 508 of the strap 452 extends between the latch block 436 and the connecting plate 534, and the latch block 536 engages the teeth 526 to prevent relative movement between the cable end 442 and the strap end 508. Thus, movement of the cable end 442 is transferred to the strap end 508.

As discussed above, the connection between the strap end 440 and the cable end 516 is similar, but

in addition a skid plate 540 (shown by dotted lines in FIG. 10) is arranged between the cable end 440 and the attachment plate 534. The skid plate additionally comprises a strap opening 542 through which, as shown in FIG. 9, the strap end 516 is passed. The skid plate 540 allows the connecting strap connecting assembly 532 to move more smoothly over the strap 458.

The cable housing 436 is attached to the base member flange 426b by the attachment assemblies 480 and 500 described above.

In particular, when the cable middle portion 444 is grasped and raised, a rotational load is applied to the housing 436. Accordingly, to prevent this housing 436 from rotating, it is secured at two points rather than simply one point. However, the flanges 426a and 426b are commonly provided with only two attachment holes such as those shown at 552 and 554 in FIG. 10. Since these are spaced a significant distance from each other relative to the size of the housing 436, a universal bracket 556 is provided. This bracket is attached to the flange 426b by the attachment assemblies 480 and 500.

More specifically, the universal bracket 556 is attached at one end to the flange 426b by the attachment assembly 480. This bracket 556 is attached at another end to the flange 426b by the attachment assembly 500. The universal bracket 556 is generally L-shaped, having an upwardly extending portion 558 and a laterally extending portion 560. The bolt 482 of the attachment assembly 480 extends

through a slot 562 in the lateral portion 560 of the bracket 556. The bolt 502 of the attachment assembly 500 extends through a hole 564 formed in the upwardly extending portion 558 of the bracket 556. A slot 566 is formed in this upwardly extending portion 558, and the bolt 546 of the attachment assembly 544 extends through this slot 566.

The bolt 546 and 502 extend through a slot 568 and hole 570, respectively, formed in the housing 436.

Because the universal bracket 556 is connected at two points to the flange 426b and the housing 436 is connected at two points to the bracket 556, the housing 436 is prevented from rotating when upward loads are applied thereto.

Referring now to FIGS. 11 and 12, depicted therein are the details of construction and operation of the housing assembly 436. In particular, depicted at 572 in FIGS. 11A and 11B, is a channel defining portion of the housing 436. FIG. 12 depicts a cover portion 574 of the assembly 436. The channel defining portion 572 defines first, second, and third channels 576, 578, and 580. In use, the cover portion 574 is attached to the channel defining portion 572 such that the channels 576, 578, and 580 are opened only at their ends.

More specifically, the cable end 440 resides in the first channel 576 and the second cable end 442 resides in the second channel 578. A bungee cord or similar resilient member 582 is arranged within the

third channel 580. A first end 584 of the bungee cord 582 is fixed relative to the housing 536, while a second end 586 of this cord 582 is attached to the middle portion 444 of the cable 438. So configured, the bungee cord 582 applies a return force on the middle portion 444 towards the housing assembly 436 against the upward forces that are applied to the cable 438 to shorten the effective length of the strap assemblies 430 and 432.

The channels 576 and 578 thus redirect the upward forces applied on the cable middle portion 444 into downward forces applied by the cable ends 440 and 442 on to the strap ends 508 and 516. The housing assembly 436 further encapsulates a significant portion of the cable 438 to prevent this cable 438 from being tangled or otherwise damages.

A comparison to FIGS. 11A and 11B illustrates that the central portion 444 is formed in a loop that, when the strap assemblies 430 and 432 are in their shortened position, it is relatively larger; this loop is relatively smaller as shown in FIG. 11B when the effective length of the strap lengths of the strap assemblies 430 and 432 are increased.

Referring now to FIGS. 13 and 14, depicted therein are plan views of the exemplary skid plate 540 and universal bracket 556 as described above.

Referring initially to FIG. 13, in addition to the cable opening 542, a rivet opening 588 is formed in the skid plate 540.

In addition to the previously described slots 562 and 566 and hole 564, the universal bracket 556

comprises additional slots 590 and 592. The universal bracket 556 having the slots and holes shown in FIG. 14 allows the present invention to be sold in the form of a retrofit kit to be mounted on to most commonly available snowboard bindings on the market.

Referring now to FIGS. 15A and 15B, depicted therein at 620 is a handle assembly that may be used to apply the upward force described above on the middle portion 444 of the cable 438. The handle assembly portion 620 will be contained within a housing (not shown). The handle assembly portion 620 comprises a center member 622 and first and second spreading members 624 and 626. The center portion 622 is attached to the bungee cord 582 described above at the location 586.

This entire handle assembly portion 620 is disposed within the loop formed by the center portion 444. The spreading members 624 and 626 are rotatably attached to the center member 622 such that they can be rotated between a collapsed position shown in FIG. 15A and an extended position as shown in FIG. 15B. Accordingly, by applying a force as indicated by arrows A in FIG. 15B, these spreading members 624 and 626 act on the cable 438 to increase the diameter of the loop portion and thus tighten the strap assemblies 630 and 632.

The loop formed by the middle portion 444 can be relatively small, and it may be difficult for the user to insert his or her finger into the loop and apply the necessary force thereon to tighten the strap assemblies 430 and 432. The force applied at

arrows A in FIG. 15B can be applied by a strap or the like that may be sized and dimensioned for easy gripping even when the user is wearing gloves.

Referring again to FIG. 9, shown at 630 therein is a spiral handle that may be used to facilitate the gripping of the loop formed at the center portion 444 of the cable 438. This spiral handle 630 can be made of, for example, flexible plastic tubing cut in a spiral shape.

Referring now for a moment back to FIG. 10, it can be seen that the ends 440 and 442 of the cable 438 can be attached to the cable attachment assemblies 530 and 532 using electrician-style crimp connectors 632. These connectors are simply crimped onto the end of the cable, and have a hole 634 formed therein through which the rivets 538 are passed.

Also, shown at 636 in FIG. 10 is a cable guide that is fixed relative to the base member 426 using the attachment assembly 480 described above. The cable guide 636 is a flat piece of metal bent over generally into a U-shape, and the cable end 440 is passed therethrough so that this cable applies a more direct downward force on the end 508 of the strap 452. The cable guide 636 has holes formed therein, and is fixed using the attachment assembly 480 described above.

Additionally, the spacers 468 and 472 described above have slanted opposing surfaces as shown in FIG. 10. These slanted opposing surfaces alter the angle at which the forward strap 452 extends relative to the flange 426a.

From the foregoing, it can be seen that the present invention may be embodied in other specific forms without departing from the essential characteristics thereof. For example, the present invention has been described herein in the context of a retrofit kit for currently existing snowboard bindings. It should be clear to one of ordinary skill in the art that the basic principles of the present invention may be embodied in a snowboard binding in which the cable housing 436 is incorporated into the side flange 426b. In this case, certain changes may be made to the appearance and specific implementation of the present invention, but it should be clear that such modifications would be well within the scope of the present invention.

The foregoing described embodiments are therefore to be considered in all respects as illustrative and not restrictive.

I claim:

1. A snowboard binding comprising:

a. a binding base;

b. a front toe strap assembly comprising a toe strap, attached to a first front side of the base, and a ratchet strap attached to a second front part of the base, said ratchet strap connected through a ratcheting member mounted to the toe strap;

c. an ankle strap assembly, comprising an ankle strap connected to a first rear side of the binding base, and a ratchet strap connected to a second rear side of the binding base, said ratchet strap extending through a ratcheting member attached to the ankle strap;

d. a tightening cable means comprising a cable having a first end operatively connected to the ratchet strap of the toe binding, and a second end operatively connected to the ratchet strap of the ankle binding;

e. said cable means having a main intermediate portion extending between the first end and the second end of the cable, said intermediate portion extending through pulley means at a forward part of the first

side of the binding, thence through a cable housing to extend through a handle member, and thence again through said housing to the second end,

whereby said cable means has a first position where the toe strap assembly and the ankle strap assembly are extended, and a second position where said handle means is pulled away from the cable housing so as to cause the first and second ends of the cable to pull on the toe ratchet strap and the ankle ratchet strap to cause said front toe strap assembly and said ankle strap assembly to tighten around a person's boot.

Fig. 1

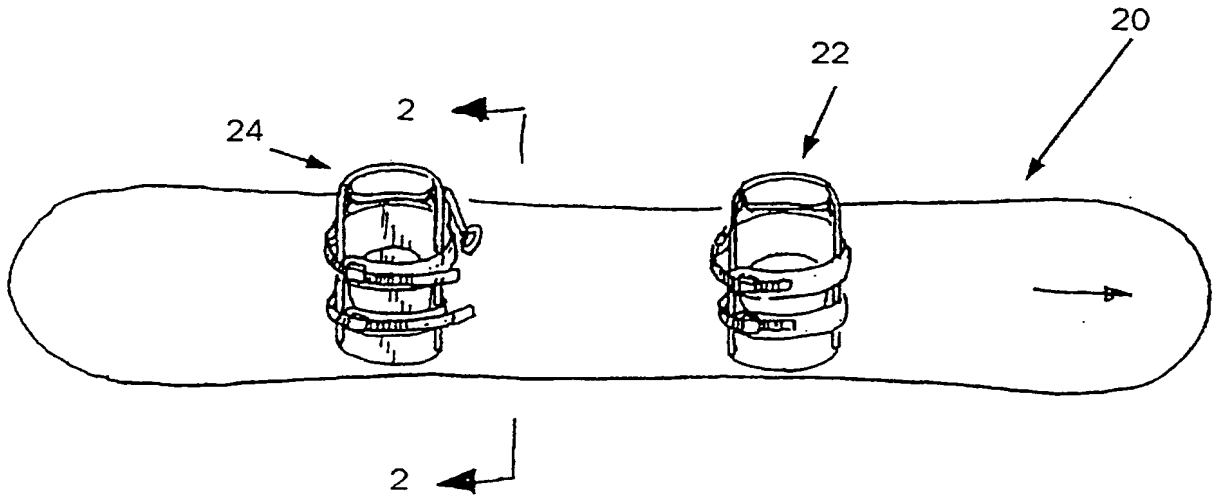
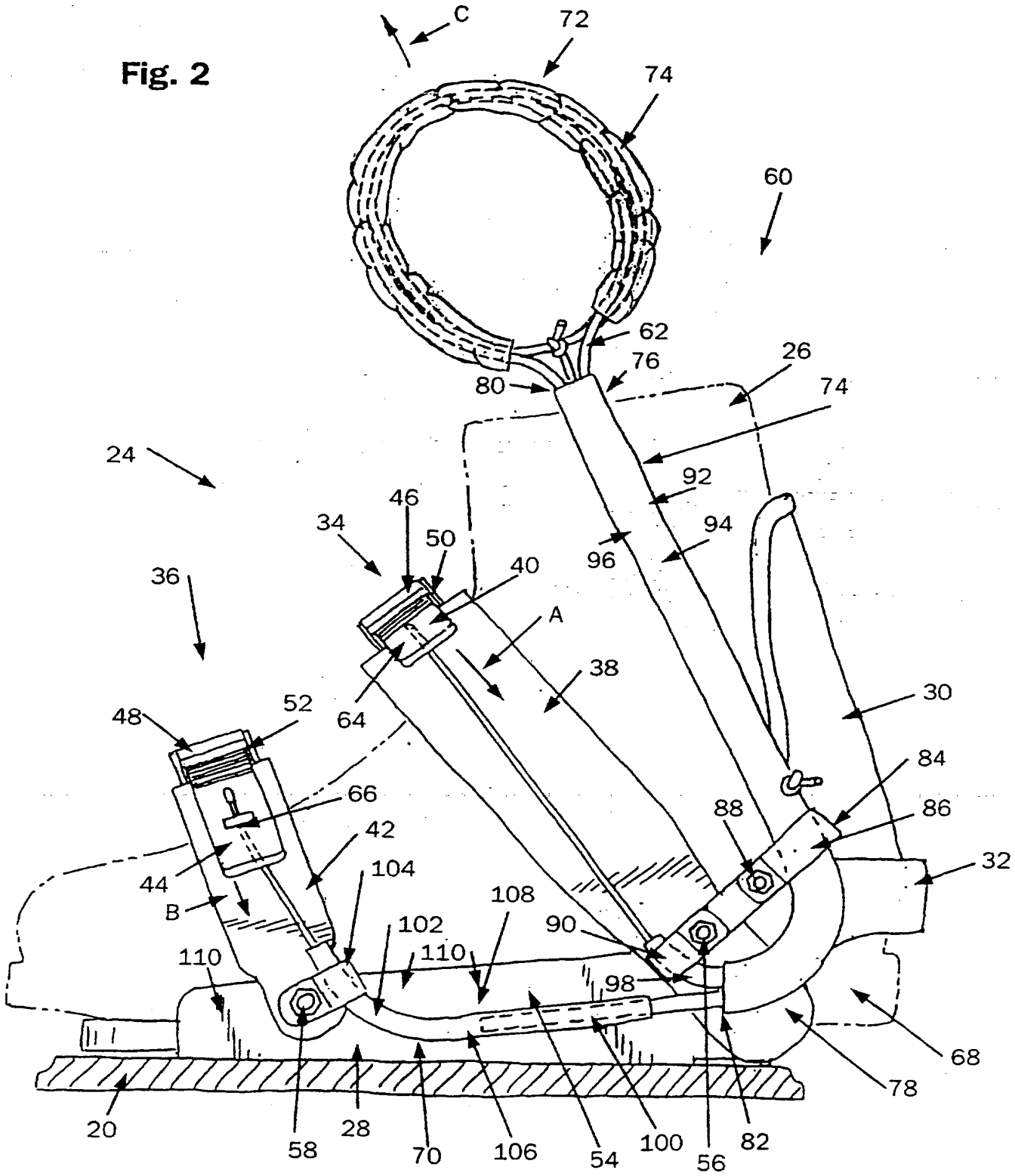


Fig. 2



SUBSTITUTE SHEET (RULE 26)

Fig 3

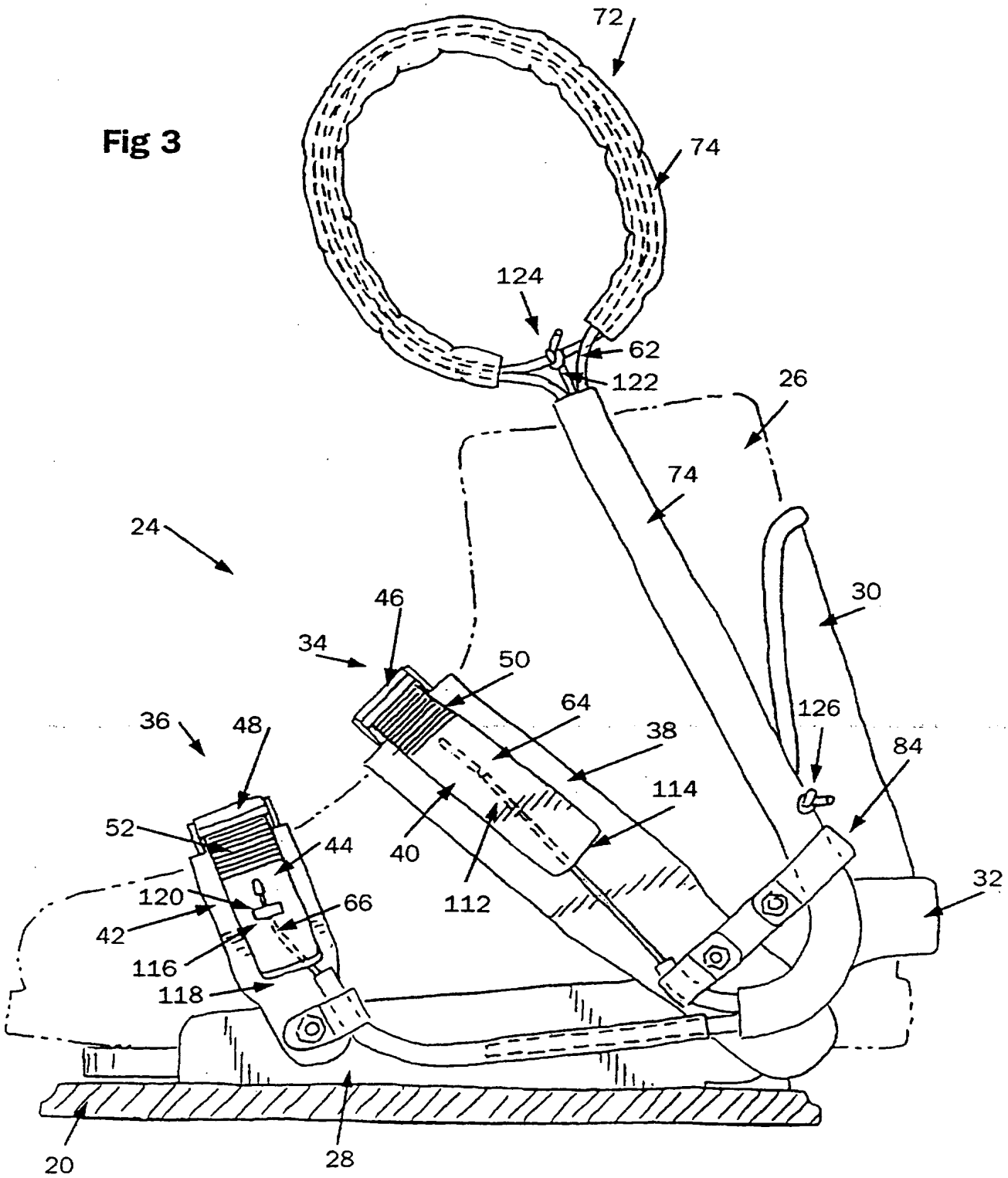


Fig 4
Prior art

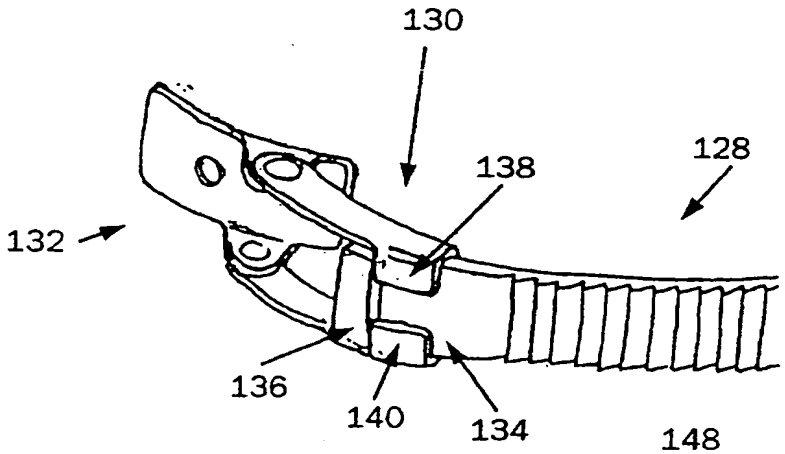


Fig 5A

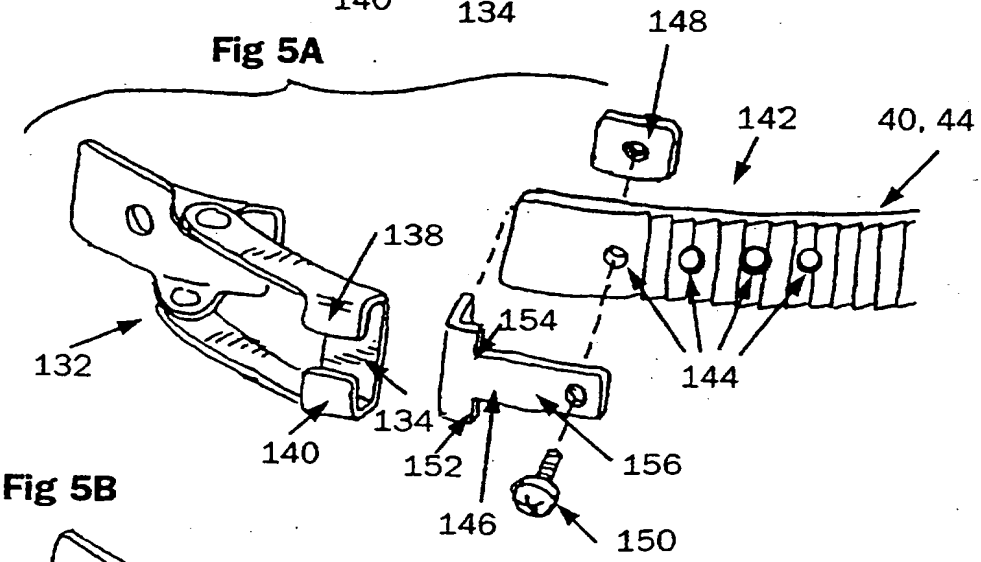


Fig 5B

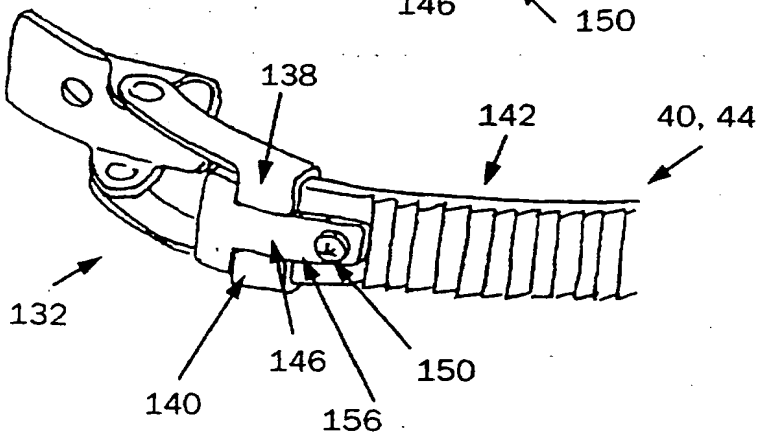


Fig 6

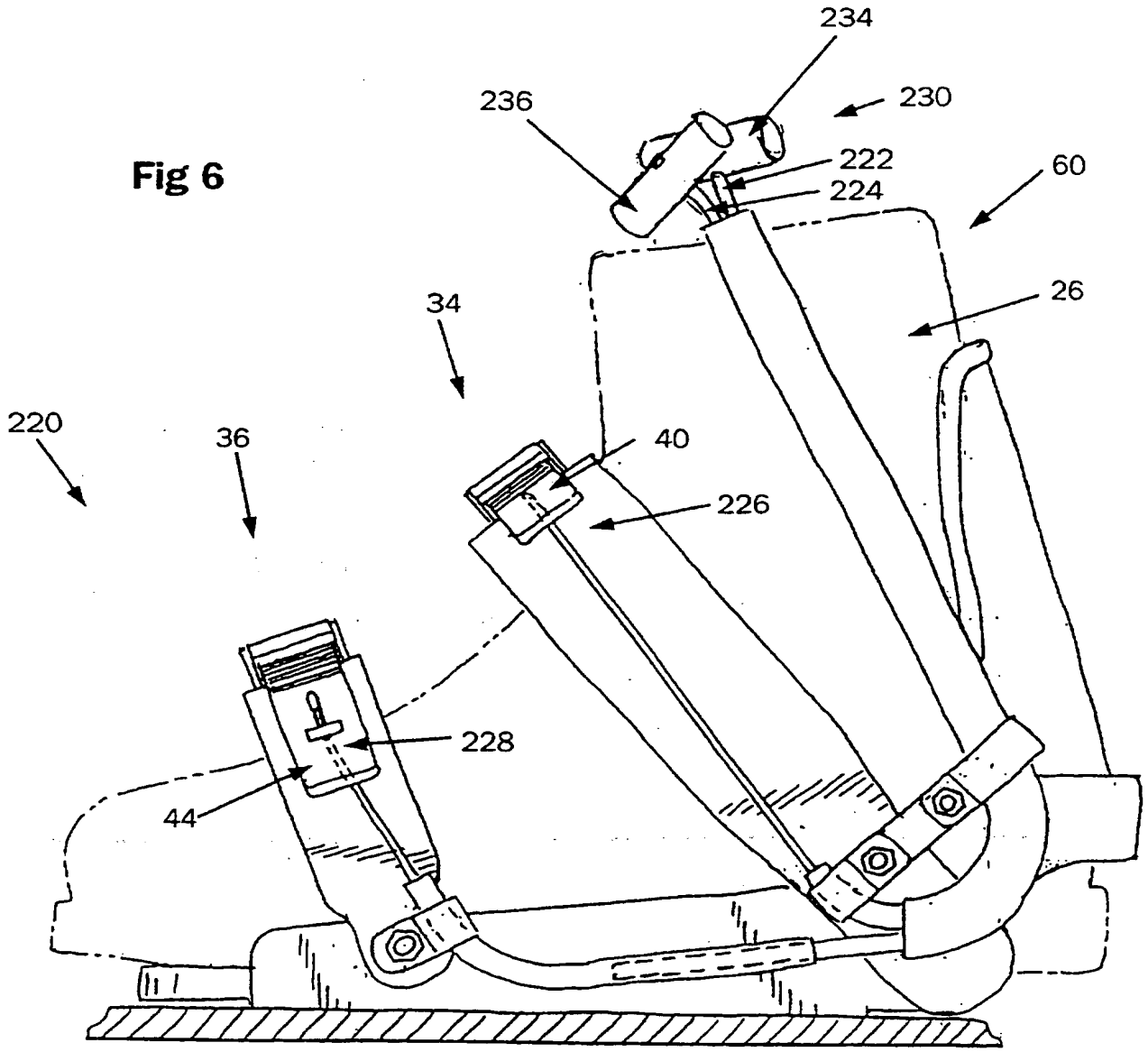


Fig 7

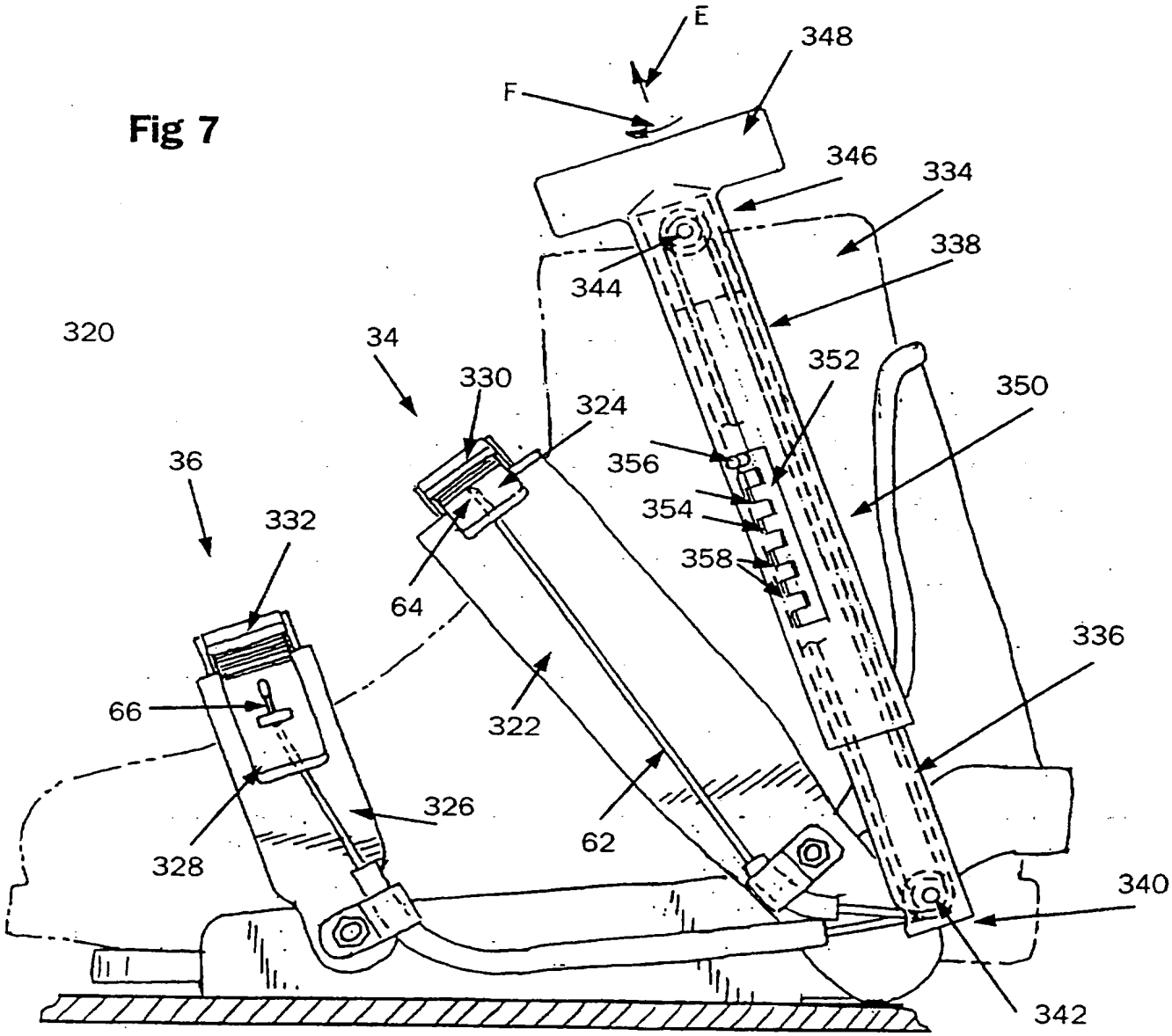

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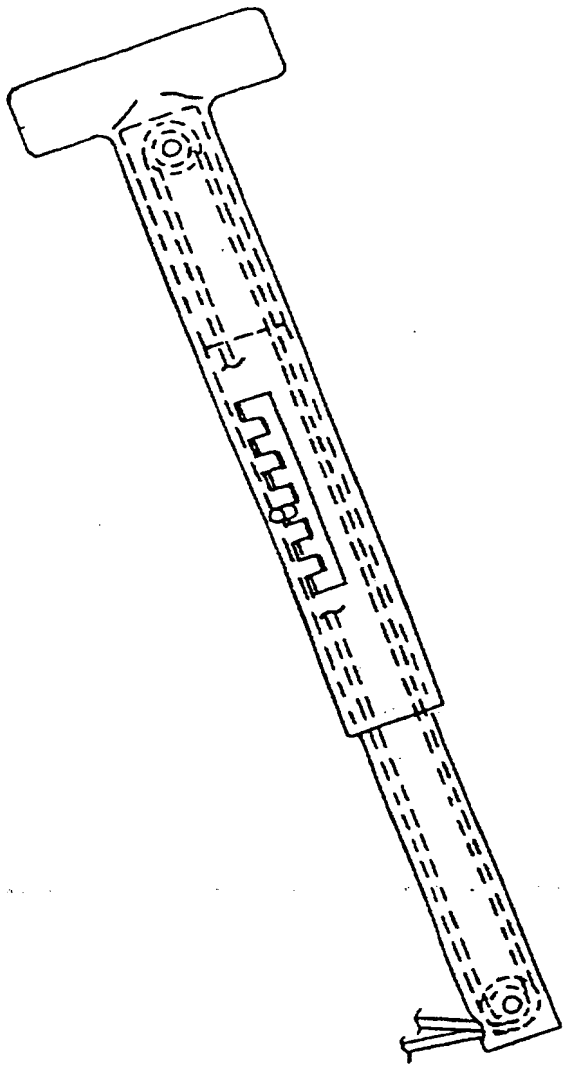
Fig 8



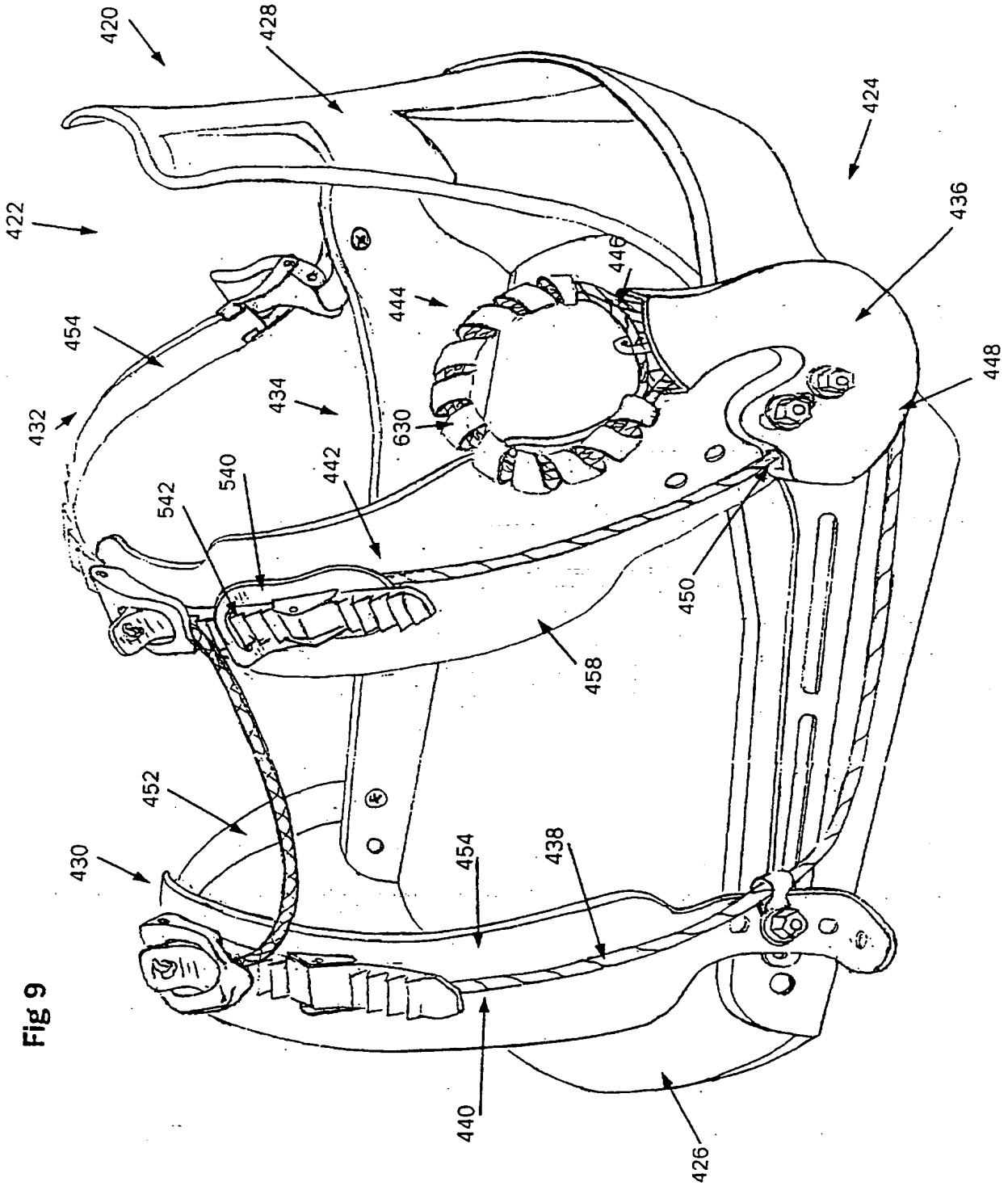


Fig 9

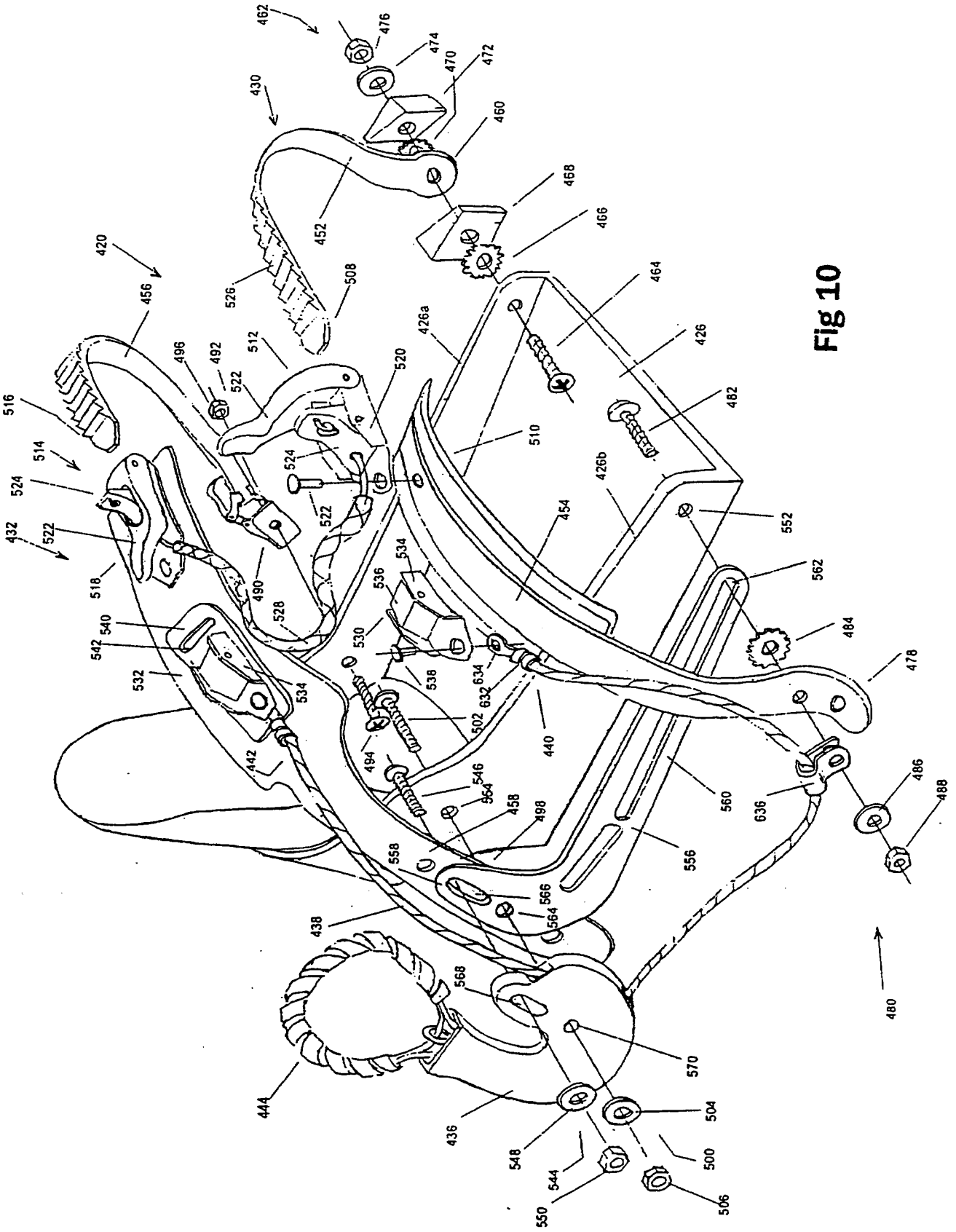


Fig 10

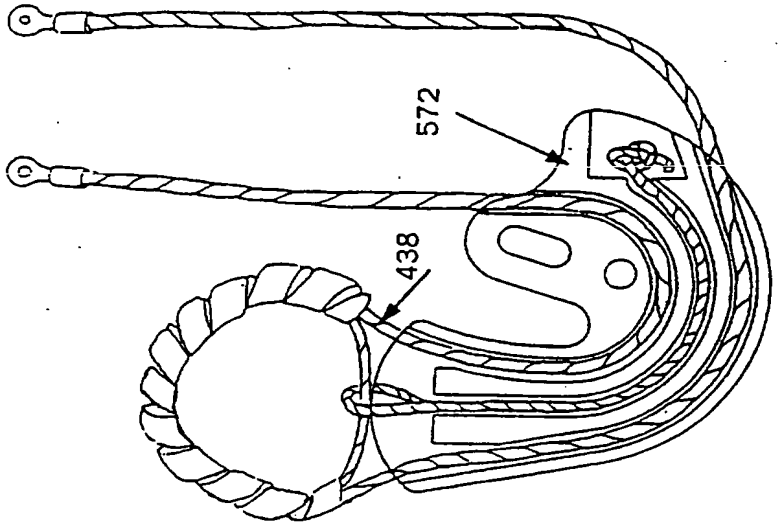


Fig 11B

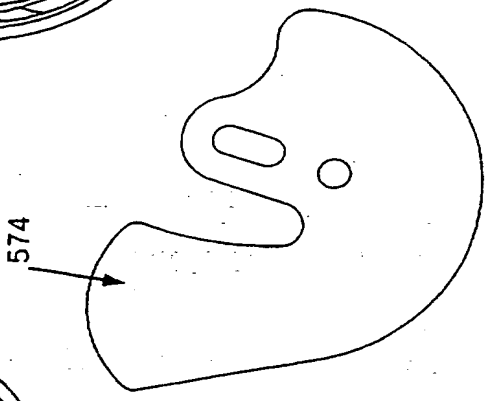


Fig 12

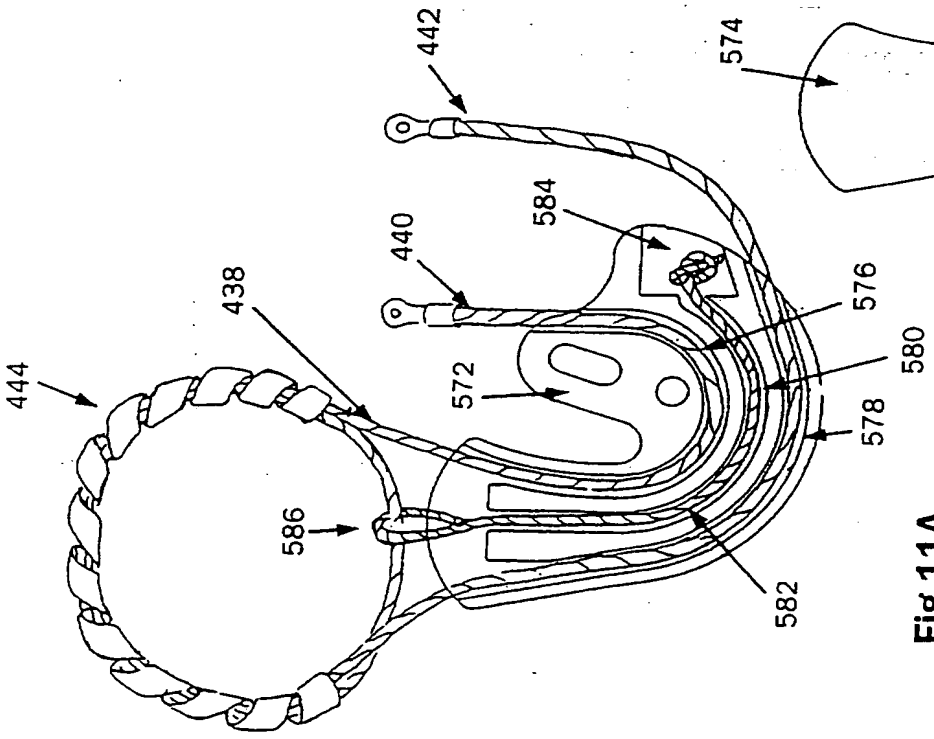


Fig 11A

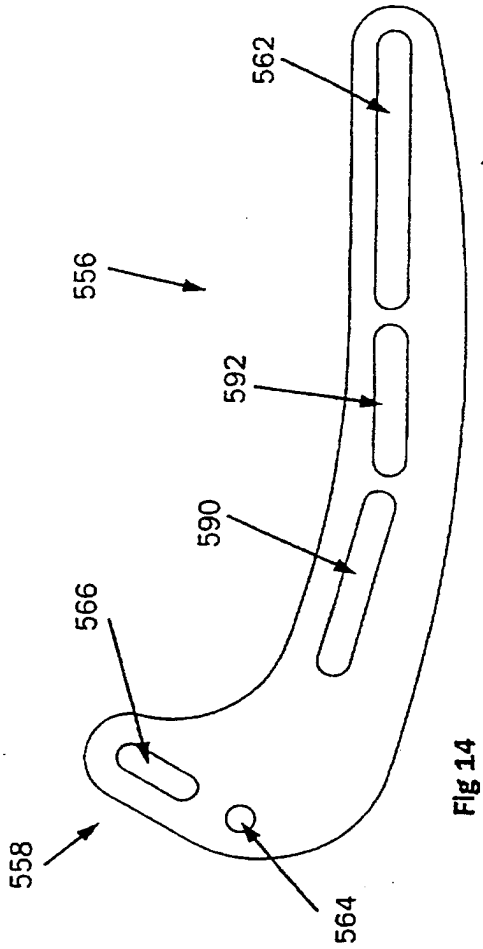


Fig 14

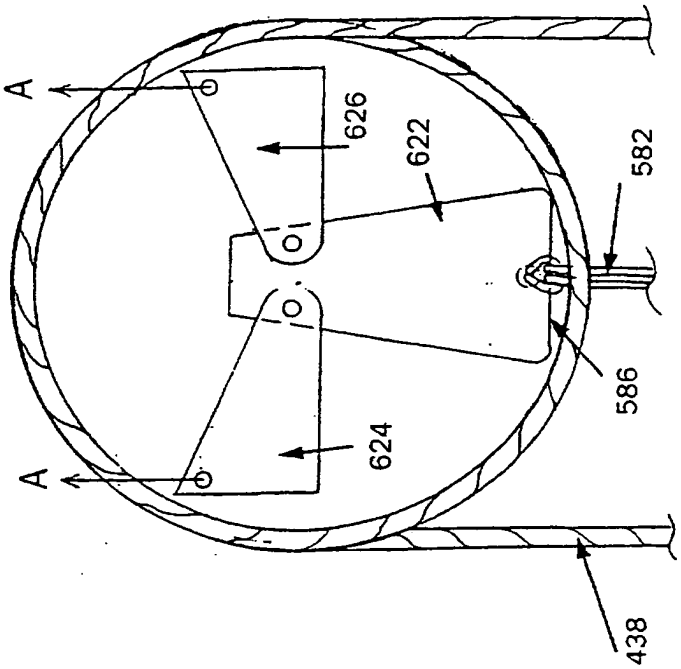


Fig 15B

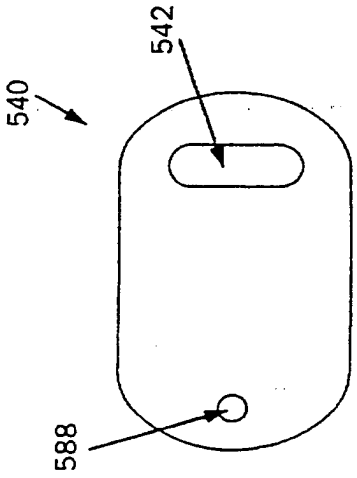


Fig 13

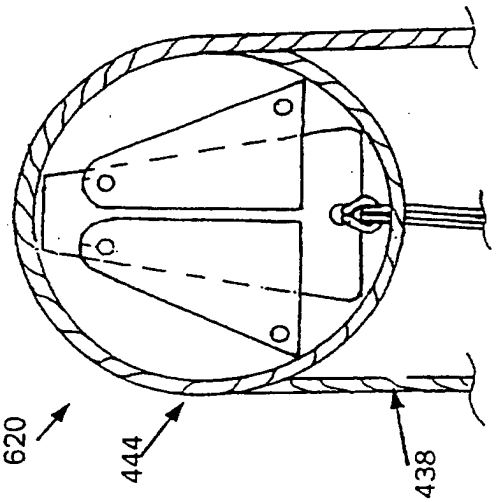


Fig 15A